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Guest editor's introduction: Experimental Software and Toolkits (EST)

1. Goal and scope

Academic software development may involve the development of huge software systems in order to perform all kinds of experiments. This can be compared with experiments in physics or chemistry. The focus of researchers developing such experimental software systems is mainly on software development. The software developer has some idea, algorithmic or functional, and in order to prove his or her idea software is adapted or newly developed. Some of these systems are distributed to different researchers and may become very popular in the community. The software development of these systems is almost always in conflict with papers that are to be written. Especially if the users community grows and the requests for enhancements and improvements increases. Another issue is related to reproducibility. In physics or chemistry papers about experiments contain a lot of technical details in order to facilitate other researchers to replay the experiments in order to validate the results described in these papers. Papers describing implementation aspects of tools are in general hard to read and reproducing results is in fact almost impossible. The effort is far too big to reimplement these tools. More and more computer scientists use the Open Source community to distribute their tools. In this way it is not necessary to reimplement tools, only to download and install them. From an academic point of view "publishing" in the Open Source community does not bring any credits or citations. The EST is a special issue of the journal Science of Computer Programming (SCP) and in this way the well-earned credits can be obtained. The application areas of experimental software systems are rather diverse, from language prototyping environments, theorem provers, visualisation tools, renovation tools, programming environments, etc.

This EST initiative is focussed on the creation of a forum where beside the paper the software system itself is published. Two questions arise here:

- What is the difference between this initiative and the open source facilities like SourceForge? The most important and challenging difference is that the software is reviewed. A number of independent referees reviewed both the system and the system description paper and gave a verdict.
- What is the difference with tool demonstrations at conferences and workshops. The difference is that at conferences tool demonstrations are accepted based on the tool demonstration only, the referee has no opportunity to install and use the system or have a look at the code.

We invited authors to submit software systems together with a short paper. We wanted to go one step further than the tool demonstrations at the various conferences. The software systems were reviewed on various aspects:

- ease of installation,
- quality of (user) documentation,
- ease of usage, and
- applicability to the intended domain.

Referees were also invited to have a look at the actual code of these systems. The major improvement over the conference and workshop tool demonstration is that a broader audience is able to use the system. The improvement over Open Source is that independent referees had a look at the tool and actually used it.

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2. Submissions

The call for systems was not restricted to a specific application domain. The first call resulted in 15 submissions, 8 submissions have been accepted for publication in this first special issue. We have already published a second call for systems and a number of submissions will be published in another special issue. A lot of people reacted very enthusiastically about this EST initiative, but finding referees turned out to be quite a challenge.

The accepted submissions cover a broad range of systems. There are systems related to attribute grammars, reverse engineering, software coordination, validation of UML, detection of invariants in code, analysis of embedded software, case-based reasoning and pedagogy of grammars. The individual papers contain URLs where the systems can be downloaded.

3. Future of EST

I hope that this EST initiative creates a forum where academic software engineers can publish their systems so that fellow researchers can download and use these systems. I hope that this will increase the quality of academic software and stimulate the development of mature academic software because the developers obtain their deserved credits.

Academic software engineering is difficult and expensive. As stated before the pressure to publish is much higher than the pressure to develop good software. Releasing/publishing the software is in fact not an end point, but quite often a starting point. Fellow researchers start using it, the bug reports and feature request reports start to occur in the mail boxes. The Open Source community can be a solution, but still someone has to feel responsible and take the lead. Besides the already mentioned fact that "publishing" in the Open Source community does not bring any credits or citations, a publisher like Elsevier guarantees that the software is still available after 20 or 30 years. Of course, it is unlikely that the software can still be compiled or executed due to changes in hardware and software platforms, but still it will not be lost.

The first issue of EST is now published, a second issue is in preparation, and lets hope that more will follow. This depends mainly on you academic software engineers whether you believe in this initiative and will keep it alive by submitting systems and by acting as referees.

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